2000 3.0L (L81) V-car (Catera) ENGINE DIAGNOSTIC PARAMETERS

2000file7.doc

Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumi-nation
Mass Air Flow Sensor	P0100	range check low range check high rationality	value difference between measured and calculated airmassflow gradient of above signal	(4...152,8 kg/h) (141...885 kg/h) > 0.39..0.408 > 2...4	battery voltage time after start Errorflag throttle position sensor difference between both throttle signals throttle 1 / throttle 2 pressure intakemanifold/ in front of throttle wot integrator stop	> 11 V > 0,6 s not set < 0,6% < 0,5 < 0,95 not set not set	continuous	two driving cycles
Intake Air Temperatur Sensor	P0110	range check high range check low	temperature	> 139,50°C < -42,75°C	only for low: time after start time in idle	 > 180s > 10 s	continuous	two driving cycles
Coolant Temperatur Sensor	P0115 P0116	range check high range check low rationality	temperature or temperature for closed loop control not reached after time	> 139,50°C < -42,75°C <model temp. -12°K timer depending on airflow	no engine speed	- > 20 rpm	continuous	two driving cycles
O2 Sensors								
Front Bank 1 Front Bank 2	P0130 P0150	circuit continuity	sensor signal voltage for time or sensor signal value for time or sensor signal value for time or sensor signal value for time	> 4,7V > 0,2s 0,996<. ..<1,004 >4...18 s > 1,2 >4...18 s < 0,8 >4...18 s	not fuel cut-off and exhaust gas temp. either one errorflag: front sensorheater, rear sensor, rear sensor aging indicator self adjust rear sensor voltage rear sensor voltage errorflags: rear sensor, rear sensor aging rear sensor voltage erroflags: rear sensor, rear sensor aging	> 750 ºC not present not present > 0,65 V or < 0,30 V > 0,65 V not present < 0,3 V not present	continuous	two driving cycles
Front Bank 1 Front Bank 2	P0131 P0151	range check low	standardized dynamic value from sensor	< 0,60	load engine speed	20,25 <.... < 40,5 % 1400<.... <2400 rpm	continuous	two driving

Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumi-nation
					lambdavalue either one errorflag: misfire, evapsystem, purge valve, fueltrim diagonsis secondary air system evapsystem close loop control maximum close loop control minimun	0,93<... <1,06 not present not performed at the moment no high loading indicated not reached or exceeded not reached or exceeded		cycles
Front Bank 1 Front Bank 2	P0132 P0152	range check high	lambda offset	> 0,03	time engine either one errorflag: rear sensor, rear sensor aging rear sensor aging diagnosis	< 2 s running not present finished	continuous	two driving cycles
Front Bank 1 Front Bank 2	P0134 P0154	no activity detected	lambda value	> 0,07	eventcounter timer exhaust model temperatur time after start flag lambda amplitude flag low loadchange flag O2-sensor maxi-mum value exceeded	> 20 > 0,5 s >200 °C >25 s present present not present	continuous	two driving cycles
Heater Front B. 1 Heater Front B. 2	P0135 P0155	range check	heater voltage or time after start and no operation readyness detected	> 3,6 V or < 2,34 V > 20 s	delaytime battery voltage heater outputstage engine battery voltage time since last engine run	>0,05 s 11,03 <... < 15,52 V active running 11,03 <... < 15,52 V > 240 s	continuous	two driving cycles
Rear Bank 1 Rear Bank 2	P0136 P0156	circuit continuity	sensor signal voltage	< 0,04 V	• rear close loop • either one errorflag: evapsystem, purge valve • secondary air system • secondary air system diagnosis • flag leakage air through secondary air system • timer • timer	established not present not running not running not present > 60 or 80 s > 600 s	continuous	two driving cycles

Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumi-nation
					• flag tank empty • engine • catalytic converter temperature • battery voltage • lambda target • time after dewpoint	not present running < 800 °C >11,03 V =1 > 80 s		
Rear Bank 1 Rear Bank 2	P0138 P0158	range check high	sensor signal voltage for time	> 1,08 V 5,1 s	• engine • catalytic converter temperature • battery voltage • lambda target value • time after dewpoint	running < 800 °C > 11,03 V =1 > 80 s	continuous	two driving cycles
Rear Bank 1 Rear Bank 2	P0139 P0159	oscillation check range check low	sensor voltage sensor voltage	stack above or below 600 mV > 0,2 V	• rear closed loop • • fuel cutoff	 enabled	continuous	two driving cycles
Rear Bank 1 Rear Bank 2	P0140 P0160	no activity detected	sensor signal voltage for time	0,401 <... < 0,519 V 60 s or 600 s	• engine • catalytic converter temperature • battery voltage • lambda target value • time after dewpoint	running < 800 °C > 11,03 V =1 > 80 s	continuous	two driving cycles
Heater Rear B. 1 Heater Rear B. 2	P0141 P0161	heater resistance	actuall heater resistance	> Map KFRINH * 5...12	• catalytic converter temperture • battery voltage • error flag heater output stage • dewpoint behind catalytic converter • timer	330<... < 520°C 11,03 <... < 15,52 V not present reached > 15 s	continuous	two driving cycles
Fuel System B. 1 Bank 1 Bank 2 Bank 2	P0171 P0172 P0174 P0175	fuel trim limits exceeded	additional or multiplicational	> 8,5 % or > 23 % < -8,5 % or < -23% > 8,5 % or > 23 % < -8,5 % or < -23 %	• fuel system status • fuel trim adaption	closed loop activ	continuous	two driving cycles
Injection Valve	P0201 to P0206	range check high range check low open circuit	voltage	IC Internal	• engine speed • battery voltage • battery voltage • time • stage had to be	> 40 rpm > 7,5 V < 15 V 300 ms ... 500 ms active	continuous	two driving cycles
Fuel Pump Primary Circuit	P0230	range check high range check low open circuit	voltage	IC Internal	• engine speed • battery voltage • battery voltage • time • stage had to be	> 40 rpm > 7,5 V < 15 V 300 ms ... 500 ms active	continuous	two driving cycles
Misfire	P0301 to	crankshaft speed fluctuation cylinder	FTP emission threshold	> 1,1 %	• engine speed • load	520 ... 6520 rpm > RLSALUN (14,25 ... 33	1000 revs continuous	two driving

Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumi-nation
	P0306 P0300	1 to cylinder 6 Multiple misfire	 catalyst damage	 misfire weighted with map rpm/load (4 ... 36) > 600	• engine speed change • load change • intake air temp • time after start • rough road • traction control • evap-system check • either one errorflag: throttle position, crankshaft sensor, reference mark sensor	%) < 4000 rpm/s < 250 %/segment >-8,25°C > 5s not detected off off not set	 200 revs	cycles im-mediate
Knock Sensor 1 Knock Sensor 2	P0325 P0330	range check low range check high	voltage	<0.. 3,5 V <4,4 ..75 V	• coolant temp. • engine speed	> 39,75°C > 2000 rpm	continuous	no
Crankshaft Position Sensor	P0335	malfunction	counter schedule of phase signal and no signal from crankshaft position sensor	> 8	• camshaft signal	active	continuous	two driving cycles
Camshaft Position Sensor	P0340 P0341	check low/high rationality	bit pattern at crankshaft marker high or low marker not plausible	>= 5 times	• engine speed	> 20 rpm	continuous	two driving cycles
Secondary Air System	P0411	flow	relative secondary air mass or relative secondary air mass without offset and secondary air mass offset value	0,25 <...< 0,711 < 0,101 for t > 5 s and > 5,2 kg/h	• either one errorflag: coolant-, intakeair-temperture, outputstage secondary airpump, -secondary air valve, evap system, outputstage pruge valve, front O2 sensors, misfire, fueltrim • intake air temperature • airmass integral from catalytic converter heating • catalytic converter temperatur • coolant temperature • altitude factor • engine rpm • airmassflow since start	not present 5,25 <.... < 40,5 °C > 0,5 < 800 °C 18,75 <... < 105 °C > 0,725 running > 0 kg	ones per trip	two driving cycles

Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumi-nation
					• secondary air system • intake air mass • and • speed for the last two parameters	active 6 <... < 40 kg/h or 4 <... < 24 kg/h or 6 <... < 140 kg/h and = 0 km/h		
Secondary Air Valve	P0412	range check high range check low open circuit	voltage	IC Internal	• engine speed • battery voltage • battery voltage • time • stage had to be	> 40 rpm > 7,5 V < 15 V 300 ms ... 500 ms active	continuous	two driving cycles
Secondary Air Pump Primary Circuit	P0418	range check high range check low open circuit	voltage	IC Internal	• engine speed • battery voltage • battery voltage • time • stage had to be	> 40 rpm > 7,5 V < 15 V 300 ms ... 500 ms active	continuous	two driving cycles
Catalyst, Bank 1 Catalyst, Bank 2	P0422 P0432	determining the oxygen storage capability by comparing the amlitude obtained from the downstream O2-sensor to a modelled sensor-signal amplitude	catalyst qualtity factor	> 0,70	• engine speed • load • fuel system status • modelled catalyst temp. • modelled signal amplitude • catalyst load value • canister purge value • either one errorflag: O2-sensor upstream and downstream, misfire, air flow sensor, throttle pos. sensor, purge system, fuel system	>1400rpm; < 2200rpm > 25 .. 30 %; < 35 .. 50 % closed loop > 380 °C > 0.25 < 6 .. 12 /s < 6 not present	75 s, once per driving cycle, in case of a fault detection one repeated test possible	two driving cycles
Evaporative Emission Control System	P0440	pressure control or or	tank pressure while com-pesation gradient measure- ment tank pressure while opening purge solenoid tank pressure for time period	< - 1,20 hPa < - 8 hPa - 14 hPa 15 s	• vehicle speed • engine status • fuel system status • canister load factor • tank pressure • engine load • intake low pressure • engine temperature at start • intake air temperature • tank pressure while compen-sation gradient	= 0 mph idle closed loop < 20 -29,375 <...< 9,35 hPa < 35,35 % > 380 hPa - 8,25 °C < ... < 75 °C - 8,25 °C < ... < 57,75 °C < 0,4 hPa	max.40 s if OK once per driving cycle max. 2 times per driving cycle	two driving cycles

Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumi-nation
					measurement • battery voltage • time after start • altitude • tank pressure while diagnosis • secondary air • secondary air diagnosis • either one errorflag: load-, electr. throttle potentiometer-, coolanttemp.-, vehicle speed-, tank pressure-, oxygensensor, idle control, purge valve -, vent control output stage, battery voltage, misfire	> 11,03 V > 1005 s or fuel mixture adaption OK (b_gae =1) < 3000 m < 13 hPa inavtive inactive not present		
Evaporative Emission Control System Leak Detected (small leak)	P0442	pressure control	leak air flow volume	> 0,075 .. 0,08	• vehicle speed • engine status • fuel system status • canister load factor • tank pressure • engine load • intake low pressure • engine temperature at start intake air temperature • tank pressure while compen-sation gradient • measurement battery voltage • time after start • altitude • tank pressure while driving cycle • secondary air • secondary air diagnosis • either one errorflag: load-, electr. throttle potentiometer-, coolanttemp.-, vehicle	= 0 mph idle closed loop < 20 -29,375 <...< 9,35 hPa < 35,35 % > 380 hPa - 8,25 °C < ... < 75 °C - 8,25 °C < ... < 57,75 °C < 0,4 hPa > 11,03 V > 1005 s or fuel mixture adaption OK (b_gae =1) < 3000 m < 13 hPa inactive inactive not present	max.40 s if OK once per driving cycle max. 2 times per driving cycle	two driving cycles

Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumi-nation
					speed-, tank pressure-, oxygensensor, idle control, purge valve -, vent control output stage, battery voltage, misfire			
Evaporative Emission Control System Purge Control Valve Circuit	P0443	range check high range check low open circuit	voltage	IC Internal	• engine speed • battery voltage • battery voltage • time • stage had to be	> 40 rpm > 7,5 V < 15 V 300 ms ... 500 ms active	continuous	two driving cycles
Evaporative Emission Control System Vent Control Malfunction	P0446	range check high range check low open circuit	voltage	IC Internal	• engine speed • battery voltage • battery voltage • time • stage had to be	> 40 rpm > 7,5 V < 15 V 300 ms ... 500 ms active	continuous	two driving cycles
Evaporative Emission Control System Pressure Sensor	P0450	range check low range check high	sensor signal value sensor signal value or sensor signal value	< - 29,375 hPa > 30 hPa <= 9,35 hPa	• time • time • time • engine status • engine temperature at start • time after start	> 5 s > 5 s > 3 s idle <= 33 °C 2 s < ... < 10 s	max. 10 s	two driving cycles
Evaporative Control System Leak Detected (large leak)	P0455	pressure control or	time for large leak detection no pressure change for	> 14,5 s > 4 s	• vehicle speed • engine status • fuel system status • canister load factor • tank pressure • engine load • intake low pressure • engine temperature at start intake air temperature • tank pressure while compen-sation gradient • measurement battery voltage • time after start • altitude • tank pressure while driving cycle • secondary air • secondary air diagnosis	= 0 mph idle closed loop < 20 -29,375 <...< 9.35 hPa < 35,35 % > 380 hPa - 8,25 °C < ... < 75 °C - 8,25 °C < ... < 57,75 °C < 0.4 hPa > 11,03 V > 1005 s or fuel mixture adaption OK (b_gae =1) < 3000 m < 13 hPa inactive inactive not present	max.40 s if OK once per driving cycle max. 2 times per driving cycle	two driving cycles

Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumi-nation
					• either one errorflag: load-, electr. throttle potentiometer-, coolanttemp.-, vehicle speed-, tank pressure-, oxygensensor, idle control, purge valve -, vent control output stage, battery voltage, misfire			
Fuel Level Sensor Circuit	P0460	range check high range check low	Voltage	> 4,8 V < 0,19 V	• time	1 s	continuous	no
Vehicle Speed Sensor	P0500	rationality	speed	< 20 km/h	• fuel cut off • engine coolant temperatur • engine speed • time	active > 64,5 °C 1800 <...< 2200 rpm > 1 s	continuous	two driving cycles
Idle Control	P0506 P0507	functional check	actual desired rpm or fuel cuts off during this idle	> 100 rpm < -200 rpm > 3 only for: < -200 rpm	• coolant temp. • intake air temp • vehicle speed • evap (high canister load) • evap diagnostic • secondary air diagnostic • either one errorflag: throttle position, vehicle speed, coolant temp. sensor, intake air sen., evap system, evap valve • load	> 80,25°C > 0,0 °C = 0 km/h off off off not set < 30 %	continuous	two driving cycles
System Voltage	P0560	range check high range check low rationality	voltage	> 17 V < 10 V < 2,5 V	• time • vehicle speed • time after start	200ms > 0 km/h 180 s	continuous	no
Brake Switches	P0571	plausibility of brake light switch (BLS) and brake test switch (BTS)	several times BLS and BTS unplausible for a certain period	> 1 s > 20 times	• no	-	continuous	no
Calculator Monitoring	P0601	ROM Check	check sum ROM error		• no		continuous	immediate
ECM	P0602	Programming Error	Security Access not armed		• no		at enginestart	immediate
Calculator Monitoring	P0603	Calculator check	Calculator Check		• no		continuous	immediate

2000 3.0L (L81) V-car (Catera) ENGINE DIAGNOSTIC PARAMETERS

2000file7.doc

Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumi-nation
Calculator Monitoring	P0604	RAM check	Read- and write-Test		• no		continuous	immediate
Function Monitoring	P0606	monitoring torque safety fuel cut off	torque out of range calculator error in function		• engine speed	> 1120 rpm	continuous	immediate
MIL	P0650	range check high range check low open circuit	voltage	IC Internal	• engine speed • battery voltage • battery voltage • time • stage had to be	> 40 rpm > 7,5 V < 15 V 300 ms ... 500 ms acttive	continuous	two driving cycles
Intake Air Throttle Charge Over 1 Charge Over 2	P1112 P1113	range check high range check low open circuit	voltage	IC Internal	• engine speed • battery voltage • battery voltage • time • stage had to be	> 40 rpm > 7,5 V < 15 V 300 ms ... 500 ms active	continuous	no
Throttle Position Sensor 1	P1120	range check high range check low rationality	voltage plausibility to airmass flow in case of deviation from poti 2	> 4,6 V < 0,195 V > 12,941 % throttle	• time • battery voltage	> 140ms > 7 V	continuous	immediate
					•			
Outputstage O2 Heater Rear B. 1 Heater Rear B. 2	P1141 P1161	circuit continuity	voltage	IC internal	• stage had to be • battery voltage	active > 9 V	continuous	two driving cycles
Throttle Position Sensor 2	P1220	range check high range check low rationality	voltage plausibility to airmass flow in case of deviation from poti 1	> 4,8 V < 0,156 V > 12,9 %	• time • battery voltage	> 140ms > 7 V	continuous	immediate
Accelerator Pedal Position Sensor Pedal Moving Detection	P1271	comparision of poti 1 and poti 2 when leaving idle range	voltage	> 0,5273 V < 0,6836 V	• battery voltage • no substitute operation of accelerator pedal position sensor	> 7 V	continuous	immediate
Accelerator Pedal Position Sensor 1	P1275	range check high range check low plausibility to poti 2	voltage volt. part. throttle range volt. full throttle range	> 4,8242 V < 0,2930 V > 0,2344 V > 0,9961 V	• battery voltage	> 7 V	continuous	immediate
Accelerator Pedal Position Sensor 2	P1280	range check high range check low plausibility to poti 1	voltage volt. part. throttle range volt. full throttle range	> 4,8242 V < 0,0977 V > 0,2344 V > 0,9961 V	• battery voltage	> 7 V	continuous	immediate
Misfire With Low Fuel	P1460	Fuel Level	Liter	< 11 l	• time or	30 s	continuous	no

Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumi-nation
					• Misfire detected or • fuel trim limits exceeded	 yes		
Immobilizer	P1501 P1502 P1503	rationality	not or wrong initialized no frequencycode received wrong frequencycode received		• at cranking			no
DV-E Control Range	P1510	range check high range check low	PWM time	> 80 % > 80 % PWM for time > 0,6 s (first threshold) or > 5 s (second threshold)	• battery voltage • status DVE-E adaption	> 7 V not set	continuous	immedi ate
DV-E Limp-Home Air Position	P1511	check of limp-home air position	throttle position	< 2,10 % > 9,71 %	• vehicle speed • engine speed • coolant temp. • intake air temp. • battery voltage • pedal position	= 0 km/h < 250 rpm 5°C <... < 100°C > 5°C > 10 V < 15 %	continuous	immedi ate
DV-E Position Throttle Blade	P1516	difference between set and actual position of throttle blade	difference value	> > 4 % .. 30 % for time > 0,5 s	• status DVE-E adaption	not set	continuous	immedi ate
DV-E Power Stage Switch Off	P1519	output	state	not set for time > 5 s	• status DVE-E adaption • duty cycle range check	not set > 80 % PWM	continuous	immedi ate
DV-E Spring Check	P1523	check of DV-E return spring	active opening throttle blade, switch off power stage and monitoring the throttle blade return	> (angle limp-home + 3%) for time > 0,56 s	• vehicle speed • engine speed • coolant temp. • intake air temp.	= 0 km/h < 250 rpm 5°C <...< 100°C > 5°C	once per DV-E adap.	immedi ate
DV-E Lower Mechanical Stop Throttle Blade	P1526	range check lower mechanical stop throttle blade	range check high range check low	< 0,24 V > 0,80 V < 4,20V > 4,77V	• vehicle speed • engine speed • coolant temp. • intake air temp. • battery voltage • pedal position	= 0 km/h < 250 rpm 5°C <...< 100°C > 5°C > 10 V < 15 %	once per DV-E adap.	immedi ate
DV-E Amplifier Adjustment	P1530	range check of amlified actual throttle blade position signal	amplification value offset value	< 4,00 V > 4,32 V < -0,055 V > 0,055 V	• vehicle speed • engine speed • coolant temp. • intake air temp. • battery voltage • pedal position	= 0 km/h < 250 rpm 5°C <...< 100°C > 5°C > 10 V < 15 %	once per DV-E adap.	immedi ate
A/C Clutch Relay Circuit	P1545	range check high range check low open circuit	voltage	IC internal	• engine speed • battery voltage • battery voltage • time	> 40 rpm > 7,5 V < 15 V 300 ms ... 500 ms	continuous	no

Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumi-nation
					• stage had to be	active		
Knock Control Module	P1602	rationality	IC output voltage	>44,983 V/s > 0,2148 V < 3,6914 V	• coolant temp. (knock control active)	> 39,75°C	continuous	no
Cruise Control Lamp Control Circuit	P1662	range check high range check low open circuit	voltage	IC internal	• engine speed • battery voltage • battery voltage • time • stage had to be	> 40 rpm > 7,5 V < 15 V 300 ms ... 500 ms active	continuous	no
Transmission MIL Request	P1700	TCM	OBD2 failure				continuous	imme-diatly
Torque Limiter	P1845	range check high	indexed torque	> maximum autorized idexed torque	• engine speed	> 40 rpm	continuous	two driving cycles
CAN-BUS Communication Malfunction	U2100	CAN-BUS circuit	Common not identified bus error		• engine speed • time	> 25 U/min > 25 sec	continuous	two driving cycles
CAN-BUS Fewer Controller On Bus Than Controlled	U2102	CAN-BUS circuit	Fewer systems on bus than programmed in the maximum configuration list	< 3	• engine speed • time	> 25 U/min > 25 sec	continuous	two driving cycles
CAN-BUS Reset Counter Overrun	U2104	CAN-BUS circuit	Reset Counter	> 40	• engine speed • time	> 25 U/min > 25 sec	continuous	two driving cycles
CAN-BUS Lost Communication With TCM	U2106	CAN-BUS circuit	No communication with TCM		• engine speed • time	> 25 U/min > 25 sec	continuous	two driving cycles
CAN-BUS Lost Communication With ABS	U2108	CAN-BUS circuit	No communication with ABS		• engine speed • time	> 25 U/min > 25 sec	continuous	immedi ate